In instances of double or bilateral tuberculous pneumonia, where the prognosis is usually unhappy, pneumoperitoneum alone would seem to be the operation of choice, irrespective of localization of lesions.

It is unfortunate that our sanatorium classifications and disease indices show a lack of precision in the exact classification of the various types of lesions falling under the heading of tuberculous pneumonia. Without a definite breakdown into types of lesions, it is most difficult to evaluate selectively. The seeker after information is defeated beforehand by the amount of work involved in culling a large enough group of selected cases over a given period of time.

SUMMARY

1. The prognosis in tuberculous pneumonia is grave. In bilateral cases especially so.
2. A preliminary "cooling off" period of basal rest, supplemented by pneumoperitoneum is desirable.
3. The length of the period of conservative therapy should be determined both by the clinical picture, and by frequent serial roentgen examinations.
4. Conversion pneumothorax is contraindicated for the immediate treatment of the extensively involved and fulminant case.
5. Fractional artificial pneumothorax may be advantageously employed in unilateral apical involvement.
6. Bilateral tuberculous pneumonias demand pneumoperitoneum alone, if any form of collapse therapy is considered applicable.

## PLEURAL EFFUSIONS COMPLICATING PNEUMOTHORAX*

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IT is reported that more than half of all pleural effusions complicating induced pneumothorax arise during the first six months of pneumothorax therapy, that from 15 to 25 per cent of all serous effusions eventually become purulent, and that from 40 to 100 per cent of purulent effusions begin as serous effusions. The findings in a series of 41 patients with pleural effusions support these figures.

The series consisted of one group of 21 patients, in whom effusion developed; and one group of 20 patients, in whom the effusion had been noted on an average of five months before coming on my wards. Sixty per cent of all effusions developed within the first six months of pneumothorax therapy, the average interval between induction of pneumothorax and the onset of effusion for the entire series being exactly six months.

Prior to the onset of effusion, the great majority of patients had far-advanced bilateral pulmonary disease and positive sputum. All but one had mechanically unsatisfactory collapse and patent cavitation and one-third also had contralateral cavitation. This 97 per cent incidence of mechanically unsatisfactory collapse is suggestive of etiological connection (Table I).

A more immediate and direct cause of the effusion was obvious only in a small fraction of the series. The onset was febrile in 26 of the 32 cases; the average maximum temperature was 102 degrees and the average duration of fever two and one-half weeks. In all patients in whom the effusion became purulent, and the type of onset of effusion was known, it was found to be febrile.

The study demonstrated the universally serous onset of effusion and the subsequent conversion to purulent fluid in 33 per cent of patients. In about 75 per cent of patients, tubercle bacilli were found in the effusion. In patients in whom the onset of effusion was febrile, the incidence of fluid positive for tubercle bacilli was three times as great as in patients in whom the onset was afebrile. Pyogenic cultures were negative throughout (Table II).

To prevent the various complications of pleural effusions, all patients were treated by frequent aspirations and most of those with purulent fluid also by intrapleural instillation of neoprontosil (Table III).

End-results regarding pneumothorax and effu-

TABLE I
*Status Prior to Onset of Effusion*

| Group and No. of Pts. | N. T. A. Classification | | Distribution of Disease | | Cavitation | | Sputum | | Type of Pneumothorax | | Average Duration of Pneumo. (months) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Mechanically | | |
| | MA | FA | Unilateral | Bilateral | Collapsed Lung | Uncollapsed Lung | + | − | Satisfactory | Unsatisfactory | |
| I 21 | 6 | 15 | 10 | 11 | 21 | 9 | 13 | 8 | 1 | 20 | 8 |
| II 20 | 2 | 18 | 7 | 13 | 20 | 4 | 18 | 2 | 0 | 20 | 4 |
| I and II 41 | 8 | 33 | 17 | 24 | 41 | 13 | 31 | 10 | 1 | 40 | 6 |

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From Olive View Sanatorium.

sion at the time of death, or at discharge from Olive View Sanatorium and in March, 1942, for those still at Olive View, reveal pneumothorax was maintained in about one-half of the patients, the great majority of whom achieved cavity closure and sputum conversion in spite of the fact that in three-fourths of the cases collapse was still mechanically unsatisfactory. Fluid persisted in only three out of the total of 41 patients and then only in small amounts. The average number of months since final aspiration was 14 for the entire series (Table IV).

In those in whom pneumothorax was maintained even though the amount of collapse at termination of treatment was practically the same as prior to onset of effusion, the average size of refills and their frequency decreased and the average intrapleural pressures at the end of refills rose to become positive. This suggests that, at least in this series, positive intrapleural pressure is a result and not a cause of the pleural effusion.

In comparing the clinical end-results with the pre-effusion status, we observe, (1) cavity clos-

TABLE II
*Pleural Effusions*
(all negative for pyogens on culture)

| Group and No. of Pts. | Type of Effusion at Onset | | Subsequent Conversion to Purulent Fluid | Tubercle Bacilli | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | + | − | Number of Specimens Examined; Methods and Results | | | | | |
| | | | | | | Smear | | Culture | | G. Pig | |
| | Serous | Purulent | | | | + | − | + | − | + | − |
| I 21 | 21 | 0 | 2 | 14 | 7 | 3 | 53 | 24 | 27 | 6 | 10 |
| II 20 | 18 | ? | 11 | 16 | 4 | 23 | 54 | 27 | 15 | 4 | 1 |
| I and II 41 | 39 | .. | 13 | 30 | 11 | 26 | 107 | 51 | 42 | 10 | 11 |

TABLE III
*Treatment of Pleural Effusions*

| Group and No. of Pts. | Average Interval between Onset of Effusion and Aspiration (weeks) | Pneumothorax | | Average | | | | | Intrapleural Medication | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | M | Not M | Number of Aspir. | Number of Mos. of Aspir. | Frequency of Aspir. (days) | Total Volume Aspirated (c.c.) | Volume per Aspiration (c.c.) | S | P |
| I 21 | 2 | 20 | 1 | 8 | 2 | 10 | 1000 | 125 | 0 | A–1 M–1 |
| II 20 | 6 (for 10 Pts.) | 10 | 10 | 23 | 6 | 9 | 2000 | 90 | 0 | A–1 N–10 |
| I and II 41 | 3 (for 31 Pts.) | 30 | 11 | 15 | 4 | 10 | 1500 | 100 | 0 | A–2 M–1 N–10 |

"M"—maintained; "S"—serous; "P"—purulent; "A"—alcohol 95%.
"M"—merthiolate solution, 1:5000; "N"—Neoprontosil solution, 2½–5%.

TABLE IV
*End-Results of Pneumothorax and Effusion*
(at time of death in, or discharge from Olive View Sanatorium and March 1942 for those still in Olive View Sanatorium)

| Group and No. of Pts. | Fate of Pneumothorax | | | Type of Pneumothorax Maintained | | Fate of Effusion | | Average Number of Months since Last Aspiration |
|---|---|---|---|---|---|---|---|---|
| | | | | Mechanically | | | | |
| | Maintained | Discontinued | Lost | Satisfactory | Unsatisfactory | + | − | |
| I 21 | 13 | 4 | 4 | 4 | 9 | 1 | 20 | 14 |
| II 20 | 7 | 13 | 0 | 1 | 6 | 2 | 18 | 14 |
| I and II 41 | 20 | 17 | 4 | 5 | 15 | 3 | 38 | 14 |

TABLE V
*Clinical End-Results*
(at time of death in, or discharge from Olive View Sanatorium and March 1942 for those still in Olive View Sanatorium)

| Group and No. of Pts. | N. T. A. Classification | | Distribution of Disease | | Cavitation | | Sputum | | Clinical Status (N. T. A.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MA | FA | Unilateral | Bilateral | Collapsed Lung | Uncollapsed Lung | + | − | D | U | I | Q | AA | A |
| I 21 | 6 (M-1) | 14 | 8 | 13 | 5 | 3 | 6 | 15 | 2 | 3 | 2 | 3 | 9 | 2 |
| II 20 | 3 | 17 | 9 | 11 | 2 | 1 | 4 | 16 | 0 | 1 | 1 | 6 | 10 | 2 |
| I and II 41 | 10 | 31 | 17 | 24 | 7 | 4 | 10 | 31 | 2 | 4 | 3 | 9 | 19 | 4 |

ure and sputum conversion in over three-fourths of the cases and (2) arrest or apparent arrest of disease in more than half. Of the 23 arrested or apparently arrested cases, three had a homolateral and one contralateral thoracoplasty; another five thoracoplasty patients were operated on too recently to be rated better than quiescent. Pulmonary cavitation and not empyema was the indication for thoracoplasty in all nine patients but an additional thoracoplasty stage to obliterate the empyema pocket was done in two cases and was successful in only one (Table V).

In reducing the incidence of tuberculous empyema in artificial pneumothorax, two procedures are suggested: (1) discontinuance of ineffective pneumothoraces as soon as the ineffectiveness of complementary collapse measures has been demonstrated; and (2) treatment of serous effusions of 100 cc. or more by frequent aspirations as they must be regarded as potential empyemas.

## PNEUMOTHORAX IN THE OLDER AGE GROUP *

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IN a group of 89 patients, varying in age from 43 to 65, pneumothorax was attempted. Cases were selected on the usual criteria for artificial pneumothorax, primarily unilateral state of the disease, presence of cavity and/or positive sputum. Forty of these cases were in the 5th decade of life, 41 in the 6th decade, and eight in the 7th decade. All but six were far advanced, and all but 10 presented cavities.

A pneumothorax pocket was established in 62 individuals, including two bilateral cases. Attempt at pneumothorax was unsuccessful in 27 cases due to adhesions; in 34 individuals the pneumothorax was abandoned in less than one year as ineffectual. Fluid was aspirated in only 15 cases; in only four did empyema develop. Spontaneous pneumothorax occurred in five patients. Adhesions were noted in 33 cases. In four cases pneumonolysis was performed, in two of whom the pneumothorax was considered effective; in another, fluid followed and the space was converted into an oleothorax. In 20 cases the pneumothorax pocket was supplemented by a phrenic crush.

The results of treatment in cases in which pneumothorax was established, as compared with the group in which it failed, were as follows:

| | Pneumothorax Pocket | | Pleural Synthesis | |
|---|---|---|---|---|
| Arrested | 6 | 10% | 4 | 15% |
| Improved | 11 | 18% | 5 | 18% |
| Unimproved | 27 | 43% | 8 | 30% |
| Dead | 18 | 29% | 10 | 37% |
| Total | 62 | | 27 | |

### SUMMARY AND CONCLUSIONS

The results show little difference between the two groups. This small series suggests: Pneumothorax effective in only 16 per cent of these patients; obliterated pleural space prevented establishment of pneumothorax in 30 per cent of these older patients; complications to pneumothorax here were not serious; other forms of collapse such as phrenic crush and/or pneumoperitoneum were as effective as pneumothorax; careful consideration of the physiologic status of the patients in the older age group should be given before attempting to establish pneumothorax.

## PNEUMOTHORAX IN THE TREATMENT OF ACUTE MINIMAL TUBERCULOSIS *

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IN ITS most characteristic connotation, the term acute minimal tuberculosis implies a recent, or relatively recent small area of pulmonary infiltration without cavitation. This lesion is most

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From Vauclain Home, San Diego.